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# Ecology of California

From Wikipedia, the free encyclopedia

"Physical history of California" redirects here. For the book, A Original History of California, see Allan A. Schoenherr.

This article is about natural Physical communities. For a information of human habitat adjustments, see Environment of California

## Mojave desert in Joshua Tree National Park

The ecology of California can be understood by dividing the state into a number of ecoregions, which contain distinct ecological communities of plants and animals in a contiguous region. The ecoregions of California can be grouped into four major groups: desert ecoregions (such as the Mojave Desert), Mediterranean ecoregions (such as the Central Valley), forested mountains (such as the Sierra Nevada), and coastal forests.[1]

Different authorities define the boundaries of ecoregions somewhat differently: this article follows the definitions of the World Wide Fund for Nature (WWF) and the United States Environmental Protection Agency (EPA)

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## Deserts

Main article: Deserts of California

California's high mountains block most moisture from reaching the eastern parts of the state, which are home to California's desert and xeric shrub ecoregions. The low desert of southeastern California is part of the Sonoran desert ecoregion, which extends into Arizona and parts of northern Mexico.[2] California has two high deserts: the Mojave desert and the Great Basin Desert. The Mojave desert ecoregion is marked by the presence of Joshua trees.[3] The dry cold Great Basin desert of California consists of the Owens Valley, and is classified into Great Basin shrub steppe by the WWF,[4] and into the Central Basin and Range ecoregion by the EPA.[5]

The deserts in California receive between 2 to 10 inches (51 to 254 mm) of rain per year.[6] Plants in these deserts are brush and scrub, adapted to the low rainfall. Common plant species include creosote bush, blackbrush, greasewood, saltbush, big sagebrush, low sagebrush, and shadscale.[6] Higher elevations have more precipitation, which allows drought-resistant trees to grow, such as western juniper and pinyon pine.[6]

Mediterranean ecoregions

California montane chaparral and woodlands in the Santa Ynez Mountains

The coast of California from Monterey Bay south to the Mexican border, and inland from San Francisco Bay Area to the Sierra Nevada foothills contain California's Mediterranean ecoregions. This region is divided by the WWF into three California chaparral and woodlands ecoregions, plus the Central Valley grasslands.[7] The EPA divides the region between the Central Valley (ecoregion 7), the Southern California chaparral (ecoregion 6), the Southern California mountains (ecoregion 8), and the Southern California coast (ecoregion 85).[5]

The WWF distinguishes between different chaparral ecoregions based on species endemism.[8] In the south, the California coastal sage and chaparral extends across the Mexican border into northwestern Baja California and Los Angeles.[8] The coastal sage ecoregion is notable for having the highest number of native bees in the United States, although much of the ecoregion is now urbanized.[8] The California montane chaparral and woodlands include the Transverse Ranges north of Los Angeles as well as the Santa Lucia Range on the Central Coast.[9] The montane chaparral consists of a mosaic of sage scrub, chaparral, and montane species, depending on altitude.[9] The California interior chaparral and woodlands form a ring around the Central Valley, covering the hills around the Bay Area as well as the foothills of the Sierra Nevada.[10] The interior woodland ecoregion contains several endemic species, due to unique soil types such as serpentine.[9]

The Carrizo Plain grassland in springtime

These chaparral ecoregions contain numerous plant communities, including oak savanna,[10] oak woodland, conifer woodlands, chamise chaparral, coastal sage scrub, and coastal grassland.[8] These plant communities often occur as a mosaic,[9] caused by fire.[11]

California's Central Valley was once a large temperate grassland containing native bunchgrasses and vernal pools.[12] Grizzly bear, gray wolf, tule elk, and pronghorn antelope used to inhabit the grasslands.[13] The native grasslands and pools have now been largely replaced by livestock ranches and farms.[14] The Carrizo Plain, where the native grass is preserved, is referred to as the "Serengeti of California".[15]

Forested mountains

Sierra Nevada lower montane forest in Yosemite Valley

The cooler and wetter mountains of northern California are covered by forest ecoregions. Both the WWF and the EPA divide the mountains into three ecoregions: the Sierra Nevada,[16] the Klamath Mountains,[17] and the Eastern Cascades Slopes and Foothills (occurring on the Modoc Plateau).[18]

The Sierra Nevada are home to half of the vascular plant species of California, with 400 species that are endemic to the region.[16] Like many mountain ranges, the plant communities of the Sierra group into biotic zones by altitude, because of the increasingly harsh climate as the altitude increases.[19] These biotic zones include montane forest dominated by conifers such as Jeffrey pine and Lodgepole pine, subalpine forest dominated by whitebark pine, up to alpine tundra which cannot support trees.[20] The Sierra are also notable for giant sequoia trees: the most massive on earth.[21]

The Klamath and Siskiyou Mountains are a notable biodiversity hotspot, containing one of the four most biodiverse temperate forests in the world.[17] The diversity is caused by the ecoregion being adjacent to a number of other ecoregions, diverse soil, and having refugia caused by isolation in the last ice age.[17] Some endemic species in the Klamath mountains are limited to only one mountain or valley.[17]

The Eastern Cascades slopes of the Modoc Plateau are characterized by a mosaic of open ponderosa pine forest, grasslands, and shrublands.[18] Although high, these slopes and mountains are in the rain shadow of the Cascade Range, and hence are drier and more open.[20]

Fog in Redwoods National Park

Coastal forests

The coast of California north of San Francisco contains the Northern California coastal forests (as defined by the WWF) and the southern section of the Coast Range ecoregion (as defined by the EPA). This ecoregion is dominated by redwood forest, containing the tallest and some of the oldest trees in the world.[22]

The redwood forests thrive in a thin belt up to 35 miles (56 km) wide next to the coast, where the trees are kept moist by winter rains and summer fog.[22] The redwood forests are also notable for having the highest forest productivity in the world.[22]

# Ecology of Florida

From Wikipedia, the free encyclopedia

Looking north on State Road 694 from bridge over Intracoastal Waterway. Indian Shores, Florida on left, mangroves on right

The ecology of Florida is one of diverse wildlife. A misconception often associated with the Florida landscape is that the changes of density and diversity of flora seem chaotic or random, however, Eugene Odum's research states that "…over the long term plant habits showed remarkable continuity."[1] The introduction of different species caused certain evolutionary developments – some plants grew more quickly and in larger numbers, while others could survive longer – to sustain themselves in a dense environment

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What makes the Florida ecology unique?

From the Florida Everglades to the Gulf Coast, Florida has its own variety of environments. Florida ecology is affected by a number of various factors including its climate, the surrounding waters, and the diverse wildlife that calls Florida home.

ClimatologyThe climatology of Florida varies from region to region due to its proximity to the equator. From central Florida to the Georgia border, the climate is generally humid subtropical, while South Florida fosters a tropical climate. The end of spring to mid-fall is characterized by a significant rainy season, subjecting Florida to hurricanes, thunderstorms, and tropical cyclones. The winter and spring is significantly drier, leading to brushfires and strict no-fire laws. While very uncommon, snow has been recorded in northern Florida; orange groves are damaged by hard freezes.

A photo of Ponte Vedra Beach, an area attracting many tourists

Water As a peninsula, Florida is surrounded on three sides by two main bodies of water, the Gulf of Mexico and the Atlantic Ocean. Due to its water centrality and extremely low ratio of land sea levels, Florida is composed of marshland, swampland, lakes, springs and rivers. Florida's largest river is the St Johns River and its largest lake, Lake Okeechobee, flows into the Florida Everglades.

Of course, Florida's beaches contributes largely to the wealth of the state. Tourists from all over the world are attracted to the beautiful beaches and the varying qualities experienced on the Atlantic and Gulf Coasts.

## Fauna

A Gulf fritillary, taken in Payne's Prairie State Park, Florida

Florida was once home to a very diverse array of wildlife.[4] Bobcats were once very prominent in Florida, but land development, drained marshland and deforestation are pushing this species of lynx into more northern are. Florida also has many species of armadillo, opossum, foxes and birds like the American eagle and osprey, but are also being forced from their natural environments and into more urban areas, contributing to high percentages of roadkill. The Wildlife Foundation of Florida[5] acts to gain collaboration of the public in order to protect and conserve all types of wildlife from land and air to water.

The insect[6] population of Florida is also unique. The Gulf fritillary is a butterfly native to Florida grasslands. One such area is Payne's Prairie[7] in Gainesville, Florida. Other Florida native insects include various species of mites including Florida termites and many types of ants, like the fire ant.

Of all the animals of Florida, the Florida panther is one of the most well-known. It is an endangered species of cougar that is only found in the swamps of Florida. Human expansion, even with the conservation geared towards protecting this creature, is sending the panther into extinction.

For more information on mammals in Florida, see the list of mammals of Florida.

## Forest ecology

Because Florida has such a wide variety of climate conditions, there are many types of forest ecosystems, including:

Upland hardwoods

Upland hardwoods are often found in patches, surrounded by flatwoods and sandhills. Many species of trees prefer these types of ecosystems so there isn't a dominant species. Many Florida State Parks are located in these types of ecosystems.

Bottomland hardwoods

Bottomland hardwoods are very low, wet areas that are located within close proximity to lakes, rivers, and sinkholes, making them prone to flooding. This environment propels the growth of deciduous trees that grow in layers with shrubs and herbaceous plants and are under constant change.

Sandhills

Sandhills are very dry, with sandy soils so it is rare that these ecosystems ever flood. Because of this sort of climate, fire often changes the landscape so that they are predominantly grass and trees with no shrubbery.

Scrub

Scrub land is extremely low in nutrients because of its sandy soil caused by frequent fires. Most often, scrubs consist of open pinelands with various oaks, shrubs, and palmetto. These plants are called xerophytic because they grow well in dry climates and have roots close to the surface to catch what little nutrients they can.

Flatwoods

Pine flatwoods are very low, flat, sandy lands that are subject to fires during some parts of the year, but may be flooded for months due to seasonal rainfall. Pine needles contribute to a nutrient rich soil so plant growth is often rapid, allowing farmers to feed their livestock.

Tropical hammocks

Tropical hammocks include many broad-leaved evergreens. These forests are restricted to South Florida because of hard freezes in the North. These areas are often used for land development because of their well-drained soils.

Human impacts

The State of Florida's landscape was mostly made up of a largely forested area, prairies, and the large wetland area now referred to as the Everglades. Throughout its landscape small rivers, swamps and naturally occurring lakes and springs made up the state. At the time the area was inhabited by the native indigenous tribes of Florida. These tribes lead a mostly subsistence-based lifestyle. A subsistence-based lifestyle consists mostly of basic farming that would provide enough food for one family unit. This way of living minimally impacted the landscape as most of the time only fertile areas of non-swamp land were utilized as the technology to drain large portions of lands and redirect water were still not widely available.

Over time, with the colonization of Florida, more and more people started to become attracted to the area. Once the technology to drain and redirect extensive areas of swamp land presented itself more and more came to lay claims to acres of land for future development. These large influxes of peoples led to the mass manipulation of the Florida landscape thus altering it permanently. Many of the activities that took place dealt with the diversion, draining or redirecting of water through the creation of various types of water ways like canals or manmade lakes, the cutting down of forests and the conversion of lands from natural to agricultural use. This intense and highly complex manipulation of the landscape caused quite a few problems for the native species of animals living there even though it solved many problems for the many new populations of people that would come to live there.[9]

Human expansion

Once humans enter a natural environment that environment almost always instantly becomes changed. As humans we need certain resources and items to live. It is not uncommon to see an entire natural environment completely cleared or manipulated to make way for the development of residential, industrial, commercial or agricultural zones. Another threat posed by humans is the creation of busy interstate highways and roads that divide whole ecosystems in half and force many migratory land animals to change their migration routes.

There are currently efforts being made to help improve the construction methods with which homes and businesses are built so that they may cause little to no damage to the environment around them.[10]

Water

Water is one of our most important and highly valued resources. It is used for farming, providing electricity, as well as plumbing, cleaning, drinking, bathing and many other things. This poses problems for the natural environment. Bodies of water, like lakes or ponds, are drained for the creation of homes or other facilities. Water can also be redirected so that certain areas that are creating new businesses or that have a large population of people moving in can have fresh clean water going directly to them instead of having to import water from other areas or buy it in large quantities to store for personal or commercial use.

In the natural environment many animal species depend on the regular flow of water as well as specific bodies of water for their survival. Draining small lakes, ponds, and river beds gets rid of a habitat that many different species of fish, alligators, insects, and other animals were dependent on for their survival. Likewise redirecting water poses just as great a threat to native species, as it does to us. When water is redirected the original flow becomes disrupted, and limits the amount of water that can be obtained at other areas.

Pollution of water

Runoff of pesticides, fertilizers, and chemicals from farming, factories, households, commercial and industrial uses causes imbalances within ecosystems. Toxic chemical runoff and byproducts from decomposing materials and foods can contaminate water supplies. Most importantly these chemicals, like mercury, wreak havoc in fisheries and cause problems like infertility, mutations, and sometimes death of the fish. Large agricultural and farming communities, as well as urban areas leak pollutants directly into the water supply that can then flow through natural environments. When pesticides and fertilizers get into the water plants are affected too. Fertilizers often contain phosphorus which can lead to an increase in growth of some water borne plants and foliage. This abnormally rapid growth can in turn cause other populations of water borne plants to dwindle because of competition for space.

Deforestation

Forests provide many benefits to the environment. They create habitats for small and large animals, insects and small organisms like bacteria and fungi that feed on decomposing tree trunks. They also store carbon. Forests are like giant banks of stored carbon. When forests are cut down in large quantities tons and tons of previously stored carbon is released into the atmosphere. Aside from storing vast amounts of carbon they also help prevent soil erosion. Areas that have been dry and arid with bare exposed soil can be recovered by planting trees around a buffer area to prevent further soil erosion. With proper care, maintenance, and patience the area can be recovered.

Deforestation is the removal of all or some trees from an area of forest for use as something else. Florida is known for having a variety of different ecosystems aside from the wet marshlands we call the Everglades. It is also home to a variety of different kinds of forests. The trees and wood obtained from these forests are used for the construction of furniture, homes, or can be sold as individually sized boards and shapes for construction. In order to obtain these large amounts of wood whole sections of trees need to be cut down. Sometimes trees are cut down simply to get to an area of preference. Another reason for cutting down large sections of trees is for the construction of new homes or buildings in an aesthetically pleasing area. "Florida has lost 22% of forests since 1953 (a loss of 1.6 million ha)."[11]

Climate change

The Florida coastline is already feeling the effects of global warming. It could change the look and appearance of Florida's coastline forever. "In fact, scientists have already observed changes in Florida consistent with the early effects of global warming: retreating and eroding shorelines, dying coral reefs, saltwater intrusion into inland freshwater aquifers, an upswing in forest fires, and warmer air and sea-surface temperatures.[12] "

Introduced fauna and flora

Introduced species are species that are brought over from non native environments, for example from China to Florida. These species often times find that their new environment is perfect for them and begin to grow and breed at extraordinary rates becoming invasive. "An invasive species is generally defined as a plant, animal or microbe that is found outside of its native range, where it negatively impacts the ecology, economy, or quality of human life.[13] " With nothing to keep them in check, since there is nothing in the new environment to challenge their boundaries, or that feeds on it, the alien species will continue to take over and sometimes push native plants or animals out of their native environments.

In Florida local and private groups have formed to help combat some of their invasive species of plants and animals. "The Florida Invasive Species Partnership (FISP) is a collaboration of federal, state and local agencies along with non-government organizations, all with a stake in managing invasive non-native species in Florida[14] "

One example of a plant species that has spread abnormally is the Old World climbing fern (Lygodium microphyllum (Cav.) R. Br.). This invasive vine can grow up to 90 feet and more, and can survive through the winter without losing much of its greenness. This vine has been known to cover whole sections, rows, and at times all of the trees in forests and line them in huge veils of sweeping green foliage. These vines pose serious fire hazards in dry areas or during dry seasons. The vine is native to the following countries:

Africa

Australia

Southeast Asia[15

Old World fern taking over a forested area

One example of an animal species that has bred without limit is the Cuban tree frog (Osteopilus septentrionalis). The Cuban tree frog found its way to Florida after hitching a ride in shipping containers on trading boats and ships. As its name implies, the frog is native to Cuba. Florida's warm, rainy and humid weather is the perfect environment for the Cuban tree frog to reproduce and breed. The only thing that seems to cause sharp declines in their populations are freezes, or unusually cold winters. These frogs have spread up and down the coast of Florida as well as around the central Florida area. They eat various types of insects and spiders, but are also cannibalistic and have caused the native Florida tree frog populations to decrease as they feed on them. "Cuban Treefrogs are 'sit-and-wait' predators. On warm nights in Florida, it is common to encounter Cuban Treefrogs hanging on walls and windows near lighted areas as they sit and wait for insects (and native treefrogs) to be attracted to the lights. As they feed, they defecate on the windows and walls, and their fecal deposits can become unsightly over time, especially if there are a lot of frogs in the area. Furthermore, when a person enters or exits his or her home at night, Cuban Treefrogs that are waiting for an insect meal may be startled and as a result will occasionally jump onto people or into their homes through open doors.[13] " The frog is native to areas such as:

Cuba

Cayman Islands

Bahamas

Endangering/extinction of Florida species

When a species becomes listed as endangered it is mostly due to a wide variety of causes usually linked to human activities.

Some of these activities include:

developing land on animal habitats

over-hunting

intentional killing off of a species

the introduction of foreign species which compete for the same resources

pollution

The state of Florida has about 33 animals, and 43 plant species that are endangered. Some of the animals that are listed are the Florida panther, the leather-back sea turtle, the West Indian manatee, and the red-cockaded woodpecker to name a few; and some of the plants that are listed are the bell-flower, scrub plum, Small's milk pea, and the water-willow.

The following link will show a list of endangered species and their current status by the US Fish and Wildlife Services:ecos.fws.gov

The following link will show a chart listing information comparing states' and their native species by the US Fish and Wildlife Services:ecos.fws.gov

Migration patterns

When an animal migrates what they are doing is simply moving from one place to another and back to their original location. Animals migrate to find good breeding grounds or areas with large amounts of food. When man made objects or constructs get in the way of an animal's routine migratory path it is forced to change its usual breeding ground or area of sustenance.

Changes in the migration patterns of panthers

The Florida panther is listed as endangered. This is because of the encroachment of developing lands and highways and other man made structures that have mostly destroyed or diminished their natural habitats. They also have trouble hunting the white-tailed deer, which is their main source of food, as they have been cut off from each other because of human developments as well.[16] Due to these developments Florida Panthers have had to change their migration routes, as well as become adjusted to smaller hunting and breeding grounds than they previously had.

Image of a Florida panther

State policies

The Florida Department of Environmental Protection is the agency responsible for protecting Florida's ecology. Its self-stated mission is to protect "our air, water and land." It is divided into 41 programs that cover three areas of interest: Regulatory Programs, Land and Recreation, and Water Policy and Ecosystem Restoration.

Regulatory programs

The DEP makes regulations and also follows up to make sure they are adhered to. Besides the normal administrative sections of the agency, there is an office of the Inspector General, which conducts audits and investigations related to preserving Florida's air, land and water. It provides an impartial judge to determine what should be done. They are supported by law enforcement and policy compliance sectors. There is also an office for siting coordination, which regulates the power grid and natural gas pipelines across the entire state.

Land and recreation

Manatee Springs State Park Florida springs04

The DEP is responsible for state-owned recreational land. This includes the entire state park system and most of Florida's beaches. There are also separate entities dealing with the trails and greenways (Florida Ecological Greenways Network) initiative, Green Lodging, and the Clean Marina program, to name just a few. The Front Porch Florida program also falls into this category; it is a program to help neighborhoods regain a sense of community. It hopes to make these communities a fun place to be. The Bureau of Beaches and Coastal Systems monitors Florida's fragile beach environments and works with local initiatives and the Army Corps of Engineers to protect and restore the beaches. It also is responsible for disaster response initiatives, such as the Deepwater Horizon oil spill beach cleanup efforts. State-owned lands are under the supervision of this department, divided into the Florida State Parks program and the Public Lands program.

Water policy and ecosystem restoration

Some programs from the other two categories also fall into this category, such as the Bureau of Beaches and Coastal Systems, because they deal with the restoration aspect of a larger issue. However, some programs are entirely within this category, such as the Wastewater Program and the Everglades Restoration program. The Springs, Water and Wetlands programs all fall into this category. These programs perform important functions by monitoring the quality and quantity of Florida's drinking water.

Progress

Florida Locator Map

FERI

In 1998, the Office of Ecosystem Management conducted the Florida Ecological Restoration Inventory (FERI). Using information gathered from the managers of all state-owned lands, they assessed the restoration needs and created a comprehensive map including the urgency of each need. This became an online database of planned, needed and completed restoration projects and the information about them. In 2000, the Bureau of Submerged Lands and Environmental Resources was awarded a grant to update FERI and expand the database to include information from other agencies. There are currently six categories in FERI. They are: cultural resource protection, ecological protection, exotic removal, hydrologic restoration/enhancement, upland restoration/enhancement, and wetland restoration/enhancement.[19]

Recovery Program

The DEP has initiated the Recovery Program, which uses ARAA federal stimulus money to fund environmental programs across the state. Diesel emissions reduction is receiving 1.7 million dollars to add electricity to rest stops so trucks do not have to idle and retrofitting school buses to make them more environmentally friendly. The Superfund program will receive $61 million to clean up hazardous waste from the Superfund hazardous waste sites. Leaking Underground Storage Tanks will use $11.2 million to clean up "orphan" petroleum storage tanks (abandoned tanks that have no party responsible for them). $750,000 from the EPA will go towards local brownfield land projects. The Clean Water State Revolving Fund will use $132.3 million to issue loans for communities to improve their waste water and storm water systems. The Drinking Water State Revolving Fund will use $88.1 million to issue loans for communities to upgrade their drinking water infrastructure.

# Ecology of the Sierra Nevada

From Wikipedia, the free encyclopedia

See Sierra Nevada for general information about the mountain range in the United States.

## Sierra Nevada forests

Mount Alice and Temple Crag in the Sierra Nevada (U.S.).jpg

Subalpine forest at the base of Temple Crag

The ecology of the Sierra Nevada, located in the U.S. state of California, is diverse and complex: the plants and animals are a significant part of the scenic beauty of the mountain range. The combination of climate, topography, moisture, and soils influences the distribution of ecological communities across an elevation gradient from 1,000 feet (300 m) to over 14,000 feet (4,300 m). Biotic zones range from scrub and chaparral communities at lower elevations, to subalpine forests and alpine meadows at the higher elevations. Particular ecoregions that follow elevation contours are often described as a series of belts that follow the length of the Sierra Nevada.[2] There are many hiking trails, paved and unpaved roads, and vast public lands in the Sierra Nevada for exploring the many different biomes and ecosystems.[3]

The western and eastern Sierra Nevada have substantially different species of plants and animals, because the east lies in the rain shadow of the crest. The plants and animals in the east are thus adapted to much drier conditions.[4]

The altitudes listed for the biotic zones are for the central Sierra Nevada. The climate across the north-south axis of the range varies somewhat: the boundary elevations of the biotic zones move by as much as 1,000 feet (300 m) from the north end to the south end of the range.[4]

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Western biotic zones

Forest in the foothills of the Sierra Nevada

Foothill Woodland and Chaparral Zone

Main article: California interior chaparral and woodlands

The lowest-elevation biotic zone in the Sierra Nevada is found along the boundary with the Central Valley.[5] This zone, stretching in elevation from 500 to 3,500 feet (150 to 1,070 m), is the foothill woodland zone, an area that is hot and dry in the summer with very little or no snow in the winter.[5] The foothills are vegetated with grasslands of mostly non-native grasses, mixed grasslands and woodlands savanna, a foothill woodland community of blue oak and gray pine, and chaparral. Many of the plant communities are similar to those found on the inner California Coast Ranges.[6] Animals typical of this zone include black bear, ringtail cat, coyote, gray squirrel, bobcat, California mule deer, and skunk.[4] In the foothills of the northern portion of the Sierra Nevada, toyon and chamise often co-dominate certain open serpentine chaparral communities.[7]

## Lower Montane Forest

Yosemite Valley is in the Lower Montane Forest.

Main article: Sierra Nevada lower montane forest

Beginning near the 3,000 foot (900 m) elevation, the hot, dry summers and cool, moist winters of the Mediterranean climate give rise to the lower montane forest zone. This zone is also known as the yellow pine forest zone. The accumulation of several feet of snow during the winter is not uncommon and can stay on the ground for several months. The diversity of tree species found in this zone make this a beautiful and interesting forest to explore. The indicator species for the lower montane forest are the ponderosa pine and the Jeffrey pine: the ponderosa pine generally occurs on the west side of the Sierra, while the Jeffrey pine occurs on the east.[4] The lower montane forests also include trees such as California black oak, sugar pine, incense-cedar, and white fir.[3] Animals that may be found in this zone include the dark-eyed junco, mountain chickadee, western gray squirrel, mule deer, and American black bear.[4] The endangered Yosemite toad is found in montane forests of the central Sierra Nevada, at elevations of 4,790 to 11,910 feet (1,460 to 3,630 m).[8]

The character of the Lower Montane Forest changes with latitude. North of Grass Valley, the lower montane forest ranges from 2,000 to 4,000 feet (600 to 1,200 m), with less ponderosa pine and more Douglas-fir.[9] In the middle Sierra, south to the Merced River, the lower montane forest has the same elevation, but precipitation decreases and the forest mixes with chaparral.[9] In the southern Sierra, the lower montane forest occurs between 3,000 to 5,000 feet (900 to 1,500 m), but can range as high as 6,000 feet (1,800 m), with ponderosa pine dominating the landscape. Unlike further north, the geology of the southern lower montane forest is dominated by granite.[9]

Mid-Montane Forest

Giant sequoia tree, Mariposa Grove, Yosemite National Park

The mid-montane forest grows on the western slopes of the Sierra Nevada at moderate elevations. North of Lake Tahoe, the mid-montane forest occurs from 3,000 to 6,000 feet (900 to 1,800 m). Between Tahoe and Yosemite, the forest ranges from 4,000 to 6,000 feet (1,200 to 1,800 m), while south of Yosemite, it occurs between 5,000 to 7,000 feet (1,500 to 2,100 m). The mid-montane zone has a mixed forest of white fir, Douglas-fir, ponderosa pine, Jeffrey pine, live oak, black oak, and tanoak, depending on location.[9]

North of Tahoe, the mid-montane forest has more white fir and Douglas-fir, and less ponderosa pine than further south. Jeffrey pine occurs on ultramafic lava soils.[9] In Yosemite and points south, giant sequoia occurs in wetter locations.[9]

Upper Montane Forest

Upper montane red fir forest.

The upper montane forest begins at higher elevations near 7,000 feet (2,100 m), where the montane climate is characterized by short, moist, cool summers and cold, wet winters. Snow begins to fall in November and may accumulate to depths up to six feet (1.8 m) and remain until June. Pure stands of red fir and lodgepole pine (the indicator species)[4] are typical of this forest. Jeffrey pine, which has bark that smells like vanilla, and the picturesque western juniper can also be found in this zone. Wildflowers bloom in meadows from June through August.[3] Common animals in this zone include the hermit thrush, dusky grouse (Dendragapus obscurus), great grey owl, golden-mantled ground squirrel, and (more rarely) the marten.[4] Upper montane forests may be viewed from the Tioga Pass Road east of Crane Flat, Glacier Point Road, and State Route 108.

The elevation of the upper montane zone shifts with latitude: it occurs from 6,000 to 8,000 feet (1,800 to 2,400 m) north of Yosemite, and 7,000 to 9,000 feet (2,100 to 2,700 m) to the south.[9]

Subalpine Forest

A foxtail pine in an open subalpine forest

Main article: Sierra Nevada subalpine zone

The upper montane forest is replaced by the subalpine forest near 9,000 feet (2750 m), where the climate is cooler with an even shorter growing season due to long, cold, and snowy winters. Accumulations of three to nine feet (1 to 2.5 m) of snow are typical. The most common tree in the subalpine forest is the whitebark pine.[10] The western white pine, mountain hemlock, and lodgepole pine are also found in this forest with many subalpine meadows that flower from July through August.[3] Many species live in, or are transient in, this zone, including Clark's nutcracker.[4] The vegetation and ecology is determined by the harsh climate, with extensive snow and wind.[11] In addition, soils are thin and nutrient-poor.[10] Due to these harsh conditions, vegetation grows slowly and at low temperatures. In addition, the stressful environment suppress species competition and promotes mutualism.[11] The marginal conditions make the Sierra Nevada subalpine zone sensitive to environmental changes, such as climate change and pollution.[12]

South of Bridgeport, the subalpine forest ranges from 9,000 to 11,000 feet (2,700 to 3,400 m) of elevation and contains foxtail pines, while to the north, the subalpine forest ranges from 8,000 to 10,000 feet (2,400 to 3,000 m) and the foxtail pine is absent.[9]

Alpine Zone

Further information: Flora of the Sierra Nevada alpine zone

The alpine zone begins near 10,500 feet (3,200 m) elevation (in the southern Sierra) and near 9,000 feet (2,700 m) (in the north).[9] This zone is easily distinguished as it is above the tree line. No trees grow in this zone due to the harsh climatic conditions. Short, cool summers with long, cold, and snowy winters are typical at these elevations. Many exposed granitic outcroppings, talus slopes, and boulder fields limit the amount of vegetation that grows here. The macrolichen flora in the Sierra Nevada alpine zone is not well developed as compared to neighboring alpine zones in the Rocky Mountains and mountains of the Pacific Northwest.[13][14] Some animal species that are adapted to this zone include the American pika, Belding's ground squirrel, the yellow-bellied marmot, and the endangered Sierra Nevada bighorn sheep.[4] This zone can be viewed up close by hiking or climbing into the high elevations of the Sierra.

Complex Table (less accessible)

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History &  Theories | Brief Paper | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance  Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog #1 | 10 | April 21 |

# Ecology Center (Ann Arbor)

From Wikipedia, the free encyclopedia

Ecology Center

EClogo stacked color-01.png

The Ecology Center is a membership-based nonprofit environmental organization based in Ann Arbor, Michigan. It works at the local, state and national levels on environmental justice, health, waste, and community issues. It was formed after the first Earth Day in 1970 by community activists in Ann Arbor. Since its founding, it has run demonstrations and campaigns to promote recycling, health care, education, and awareness about healthy foods and products.[1]

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Vision

The vision of the Ecology Center is a world of healthy people living in harmony with the natural world. We promote clean industries making non-toxic, waste-free, bio-based products for a world fueled by clean energy, fed by local organic food, and housed in communities that enhance the natural world’s biological diversity.

## History

After the first Earth Day in 1970, community activists in Ann Arbor formed the Ecology Center to promote safe and healthy environments for people. Among their demonstrations and projects the group created a recycling program which have since grown into a wholly owned green business. In the 1990s, the Ecology Center created one of the largest land preservation programs in the country. As of 2010 more than 8,000 acres of farms and natural areas in southeast Michigan have been protected.[2]

The Ecology Center led a statewide campaign that closed every single one of Michigan’s 157 medical waste incinerators—the second leading source of mercury and dioxin emissions into the environment

A coalition led by the Ecology Center won federal mandates to remove lead and recover mercury from vehicles in the United States.

Beginning in 2005, the Ecology Center developed a unique resource, HealthyStuff.org that tests common products for lead, mercury, or other toxic chemicals.

In 2011, the Ecology Center was named a "Green Leader" by the Detroit Free Press. The award recognizes "individuals, businesses and organizations who exhibit excellence in environmental responsibility."

In July 2011, the Ecology Center moved into an expanded office at 339 E. Liberty, Ann Arbor, known as the Handicraft Building. In keeping with the Ecology Center's mission, the new office space incorporated many green features, including sustainable and recycled materials. [3] Students from Eastern Michigan University designed furniture for the office using reclaimed materials.[4]

## Programs

Climate & Energy

The Ecology Center's Clean Energy, Clean Fuels Campaign promotes policy solutions that increase United States energy independence, decrease Michigan's global warming pollution, and encourage sustainable agricultural and forestry practices that improve soil quality, enhance wildlife habitat, and preserve other conservation values

## Environmental Education

The Ecology Center brings hands-on environmental lessons to schools throughout southeastern Michigan. Programs include classroom visits, teacher training and curriculum development and web links and printed resources for teachers. [5]

Michigan Network for Children's Environmental Health

The Ecology Center is a member of the Michigan Network for Children's Environmental Health which aims to promote healthy and safe environment for children through advocacy, education, outreach, and cooperation with health professionals, health affected groups, and environmental organizations.[6]

HealthyStuff

A website launched by the Ecology Center, HealthyStuff offers a listing the amount of lead, arsenic, mercury, chlorine, and bromine in over 900 products including toys, school supplies, car seats, automobiles, pet products, apparels, and home improvement tools and supplies. [7]

Land Use

The goal is to preserve farmland and natural areas, concentrate development where infrastructure exists, and reduce traffic congestion.

Recycle Ann Arbor

Founded in 1977, Recycle Ann Arbor is a nonprofit organization that grew out of the Ecology Center recycling program. It is Michigan’s first curbside recycling program in 1978 and currently operates dropoff stations and reused building material and household supply shops for Ann Arbor residents.[8] See also Energy Works Michigan [9]

Campaigns

Healthy Food in Health Care

The ecology center works with hospitals across Michigan to provide locally and sustainably produced foods for their patients and staff. To date over 300 hospitals across the nation have signed on.[10]

Green Chemistry

Green chemistry is a scientific movement aimed at replacing toxic chemicals with safer alternatives. The Ecology Center has been involved in the movement shortly after its founding and received a Green Chemistry Gubernatorial Awards in 2009 by the state governor. [11]

Built by Michigan

The Built By Michigan coalition brings together small business, large business, workers, families, electric vehicle owners and car aficionados, environmental and faith based organizations, and more to advance the manufacturing and sales of the electric vehicle in Michigan to strengthen the local economy and increase employment in the state. [12]

Energy Works Michigan

Energy Works Michigan is a non-profit technical resource building foundational capacities for a sustainable, equitable, and prosperous future in Michigan. [13]

Save Land, Build Community

The Ecology Center helps local communities develop additional tools for preservation — in particular, local funding to buy land or development rights from willing sellers. Since 2000, the Ecology Center has led or co-organized five separate successful land preservation ballot campaigns in the Ann Arbor area, raising over $100 million that’s projected to save over 10,000 acres of working farms and natural areas. We’ve also helped bring together community leaders to discuss regional solutions to regional land use problems. [14]

# Ecology of the Rocky Mountains

From Wikipedia, the free encyclopedia

Main article: Rocky Mountains

Bighorn sheep (such as this lamb) have declined dramatically since European-American settlement of the Rocky Mountains.

The ecology of the Rocky Mountains is diverse due to the effects of a variety of environmental factors. The Rocky Mountains are the major mountain range in western North America, running from the far north of British Columbia in Canada to New Mexico in the southwestern United States, climbing from the Great Plains at or below 1,800 feet (550 m) to peaks of over 14,000 feet (4,300 m). Temperature and rainfall varies greatly also and thus the Rockies are home to a mixture of habitats including the alpine, subalpine and boreal habitats of the Northern Rocky Mountains in British Columbia and Alberta, the coniferous forests of Montana and Idaho, the wetlands and prairie where the Rockies meet the plains, a different mix of conifers on the Yellowstone Plateau in Wyoming and in the high Rockies of Colorado and New Mexico, and finally the alpine tundra of the highest elevations.

These habitats are home to a great deal of wildlife from herbivores, such as elk, moose, mule deer, mountain goat and bighorn sheep, to predators like cougar, Canada lynx, bobcat, black bear, grizzly bear, gray wolf, coyote, and wolverine, along with a great variety of small mammals, fish, reptiles and amphibians, numerous bird species, and tens of thousands of species of terrestrial and aquatic invertebrates and soil organisms.[1]

Permanent human settlement of the Rocky Mountains has caused numerous species to decline in population, including species of trout, birds, and sheep. Gray wolves and grizzly bears were completely eliminated from the United States portion of the range, but are returning due to conservation measures.

The population of black bears in the Rocky Mountains is neither dramatically increasing nor decreasing.

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Setting

Mount Elbert rises through multiple biotic zones, with alpine tundra at its peak.

The Rocky Mountains range in latitude between the Liard River in British Columbia (at 59° N) and the Rio Grande in New Mexico (at 35° N), and in height up to the highest peak, Mount Elbert at 14,440 feet (4,400 m), taking in great valleys such as the Rocky Mountain Trench and San Luis Valley. Precipitation ranges from 10 inches (250 mm) per year in the southern valleys[2] to 60 inches (1,500 mm) per year locally in the northern peaks.[3] Average January temperatures can range from 20 °F (−7 °C) in Prince George, British Columbia to 43 °F (6 °C) in Trinidad, Colorado.[4]

Biotic zones

Ecologists divide the Rocky Mountain into a number of biotic zones, defined by whether they can support trees, and the presence of one or more indicator species. Areas of the Rockies that do not support or have few trees include the prairie of the eastern foothills and the Alpine tundra. The foothill prairie grassland lies to the east of the Rockies where the mountains fall to meet the Great Plains at the Rocky Mountain Front (below roughly 1,800 feet (550 m)). Alpine tundra meanwhile occurs in regions above the treeline, which varies from 12,000 feet (3,700 m) in New Mexico to 2,500 feet (760 m) at the northern end (near the Yukon).[4]

## Bison grazing in grassland, Montana

The USGS defines ten forested zones in the Rocky Mountains.[1] The more southern, warmer, drier zones are defined by the presence of pinyon pines/junipers, ponderosa pines, or oaks mixed with pines. The more northern, colder, wetter zones are defined by Douglas-firs, Cascadian species (such as western hemlock), lodgepole pines/quaking aspens, or firs mixed with spruce. Near the treeline, zones can consist of white pines (such as whitebark pine or bristlecone pine); or a mixture of white pine, fir, and spruce that appear as shrub-like krummholz. Finally, rivers and canyons are home to unique forest habitats even in the more arid parts of the mountain range.[1]

Biotic zones and vegetation types in the Rocky Mountains can be explained by elevation, aspect, and precipitation. Clinton Merriam recognized that two-dimensional diagrams of elevation and aspect described plant community distribution in the Southern Rocky Mountains.[5] Other ecologists generally embraced this two-dimensional view until the complexities of environmental gradients such as temperature, precipitation, solar radiation, wind, soils, and hydrology could be described and modeled. Peet provided the most complete description of 10 major forest community types, which are summarized here.[6] Two nonforested vegetation types, plains and alpine tundra, described by Sims[7] and Billings,[8] are added. Because of the variations in latitude and precipitation along this huge mountain range, the elevations presented here are gross generalizations.[1]

## Plains

The eastern side of the Rocky Mountains is bordered by mixed-grass prairie to the north and by short-grass prairie to the south. The prairie, some of which has been described as the Montana Valley and Foothill grasslands generally extends to elevations of 1,800 metres (5,900 ft). Dominant plants of the mixed grass prairie include little bluestem, needlegrasses, wheatgrasses, sand-reeds, and gramas, with dropseeds and cottonwoods in riparian zones. Short-grass prairie species include little bluestem, buffalo grass, western wheatgrass, sand dropseed, ringgrass, needle-and-thread, Junegrass, and galleta.[7] Extensions of these vegetation types reach well into the Rocky Mountains along the valleys and on dry slopes. Plant species composition varies locally with changes in soil characteristics and topographic position—that is, from hilltops to valley bottoms.[1]

Riparian and canyon forests

Broad-leaved deciduous cottonwoods, alders, and willows, and aspens line streamsides and canyons. The herbaceous layer in riparian communities is often more diverse than upslope areas and adjacent forests.[6] Riparian and canyon vegetation types are generally too thin or too small to be displayed on regional vegetation maps, but the habitat is extremely important in the arid West.[1]

In the southern Rocky Mountains, a transition occurs between about 1,800 and 2,500 metres (5,900 and 8,200 ft), where plains communities are accompanied by pinyon pines. Mexican pinyons and singleleaf pinyons are found in western Utah, alligator junipers and Rocky Mountain junipers grow to the south, and Utah junipers grow to the north. Many shrubs and grasses of the plains occupy the gaps between tree outcrops. Heavy livestock grazing is associated with the spread of junipers (by reducing competition from grasses), and fire suppression is partly responsible for their continued dominance.[1]

# Η Οικογένειά μου.